REMARKS/ARGUMENTS

[1]Remarks for Amendments Made to Claims 1, 3 – 8, 10 – 11:

[1.1] In view of examiners detailed action item No. 2, Claim 1 has been amended as follows:

"non-vacuum" is deleted before "process for the fabrication of …";

"with an inverted device structure" is inserted after "… and opto-electronic device";

"low work function" is inserted between "forming a first" and "electrode layer";

"on a conducting substrate using an electrodeposition technique" is added after "forming a first low work function electrode layer";

"using non-vacuum processing techniques" is deleted from three (3) places;

The amended Claim 1 reads as:

1. A process for the fabrication of an electronic and opto-electronic device with an inverted device structure based on organic semiconductors comprising the steps of:

- *forming a first low work function electrode layer on a conducting substrate using an electrodeposition technique;*
- *forming at least one organic semiconductor material layer; and*
- *forming a second high work function electrode layer.*

[1.2] Claim 3 has been amended as follows:

"non-vacuum" is deleted before "process as defined in Claim 1 …";

"non-vacuum processing techniques for forming said first electrode layer and said second electrode layer are independently selected from a group of electrochemical processing techniques including electroless deposition and electrodeposition." is deleted after "…as defined in Claim 1 wherein said"; and

"Said electroless deposition and" is deleted before "electrodeposition may be carried out …".

The amended Claim 3 reads as:

3. A process as defined in Claim 1 wherein said electrodeposition may be carried out in either aqueous phase or organic phase.

[1.3] Claim 4 has been amended as follows:

"non-vacuum" is deleted before "process as defined in Claim 1 ...";

"said non-vacuum processing techniques for forming said first electrode layer and" is deleted;

"high work function" is inserted between "said second" and "electrode layer";

"is formed using" is inserted after "electrode layer";

"are independently selected from a group of" are deleted before "solution processing techniques ..."; and

"spin coating" is deleted after "solution processing techniques including".

The amended Claim 4 reads as:

4. A process as defined in Claim 1 wherein said second high work function electrode layer is formed using solution processing techniques including thermal transfer printing, spray and screen printing.

[1.4] Claim 5 has been canceled.

[1.5] Claim 6 has been amended as follows:

"non-vacuum" is deleted before "process as defined in Claim 1 ...";

"and second electrode layers are" is deleted after "wherein deposition of said first";

"low work function electrode layer is" is inserted before "performed in"; and

"a chamber" is replaced with "an electrodeposition unit, said electrodeposition unit being enclosed in a closed chamber".

The amended Claim 6 reads as:

6. A process as defined in Claim 1, wherein deposition of said first low work function electrode layer is performed in an electrodeposition unit, said electrodeposition unit being enclosed in a closed chamber containing an inert gas and a reduction agent.

[1.6] Claim 7 has been amended as follows:

"non-vacuum" is deleted before "process as defined in Claim 1 ...";

"treating" has been replaced with "post-deposition treatment on"; and

"first and second" has been inserted before "electrode layers ...".

The amended Claim 7 reads as:

7. A process as defined in Claim 1, further comprising a step of post-deposition treatment on said first and second electrode layers in a reducing atmosphere in order to minimize contents of oxygen and water.

[1.7] Claim 8 has been amended as follows:

"non-vacuum" is deleted before "process as defined in Claim 1 ...";

"said non-vacuum processing techniques for forming" is deleted before "said organic semiconductor layer"; and

"are selected form a group of solution processing techniques of ..." is replaced with "is formed using solution processing techniques including ...".

The amended Claim 8 reads as:

8. A process as defined in Claim 1 wherein said organic semiconductor layer is formed using solution processing techniques including spin coating, screen printing, thermal transfer printing, spray and dip-coating.

[1.8] Claim 10 is amended as follows:

"non-vacuum" is deleted before "process as defined in Claim 1 ...".

[1.9] Claim 11 is amended as follows:

"non-vacuum" is deleted before "process as defined in Claim 1 ..."; and

"with an inverted device structure" is inserted after "wherein said organic electronic and opto-electronic device", so that the amended Claim 11 reads as:

11. A process as defined in Claim 1, wherein said organic electronic and opto-electronic device with an inverted device structure being selected from a group of: organic light emitting diode, organic thin film transistor, organic solar cell, organic photodiode, organic memory chip, organic electronic circuit, and organic sensor.

[2]Arguments for Claims Rejected under 35 U.S.C 102 (b):

[2.1] Please allow Claims 1 and 11of the present application, which are rejected by the examiner under 35 U.S.C 102 (b) (refer to examiner's detailed action item No. 2) as being anticipated by Sturm (US Patent No. 6,087,196), based on the following grounds:

Claim 1:

After the amendment in section [1.1] of this paper, Claim 1 of the present application **no longer** claims a non-vacuum process for the fabrication of an electronic and opto-electronic device. Instead, the amended Claim 1 of the present application teaches a process to fabricate an electronic and opto-electronic device **with an inverted device structure** using **an electrodeposition technique** to form the first low work function electrode layer. Therefore, Sturm's process cannot be used to anticipate the amended Claim 1 of the present application.

Claim 11:

After the amendment to Claims 1 and 11, the present application teaches a process for fabrication of electronic and opto-electronic devices, including light emitting diode, **with an inverted device structure**. Therefore the amended Claim 11 of the present invention is not anticipated by Sturm.

[3]Arguments for Claims Rejected under 35 U.S.C 103 (a):

[3.1] Please allow Claims 3 and 4 of the present application, which are rejected by the examiner under 35 U.S.C 103 (a) (refer to examiner's detailed action item No. 6) as being unpatentable over Sturm (US 6,087,196), in view of Dimitrakopoulos (US 6,334,662) and Dubin (US 5,833,820), based on the following grounds:

Claims 3:

After the amendment made to Claims 1 and 3 (sections [1.1] and [1.2]), Claim 3 teaches that electrodeposition of the first low work function electrode layer is carried out in either an aqueous phase or organic phase. Therefore Claim 3 of the present application would not have been obvious to one with skill in the art at the time of the invention to modify Sturm and deposit the low work function electrodes by an electrodeposition process declared by Dimitrakopoulos (Claim 6, column 10) or Dubin (in column 9, line 7).

Claims 4:

After the amendment made to Claims 1 and 4 (sections [1.1] and [1.3]), Claim 4 of the present application teaches methods for the formation of the second high work function electrode in devices **with an inverted device structure**, using solution processing techniques including thermal transfer printing, spray and screen printing, but **excluding** spin coating and electrodeposition. Thus, Claim 4 of the present application would not have been obvious to one with skill in the art at the time of the invention to modify Sturm and deposit the second high work function electrode by an electrodeposition process declared by Dimitrakopoulos (Claim 6, column 10). Claim 4 of the present application would also not have been obvious to one with skill in the art at the time of the invention to modify Sturm and deposit the second high work function electrode by a solution deposition process (spin coating) or an electrodeposition process declared by Dubin (in column 9, line 7).

[3.2] Please allow Claims 6 and 7 of the present application, which are rejected by the examiner under 35 U.S.C 103 (a) (refer to examiner's detailed action item No. 7) as being unpatentable over Sturm (US Patent No. 6,087,196), in view of Dubin (US 5,833,820), based on the following grounds:

Claim 6:

After the amendment made to Claims 1 and 6 (sections [1.1] and [1.5]), Claim 6 of the present application teaches a method to **enclose** the **electrodeposition unit** for the first low work function electrode **in a closed chamber** filled with inert gas and a reduction agent. This chamber will not only prevent oxidation of the low work function electrode layer during the deposition by filling the surrounding space of the deposition unit with inert gas and reduction agent. It also provides a safe environment for the highly reactive low work function electrode layer during retrieving and drying processes and any other subsequent processes. Therefore, the closed chamber filled with inert gas and reduction agent deprives the deposited low work function electrode layer of the chance **to get in contact with oxygen and moisture.**

Dubin discloses an electroplating system containing apparatus surrounding **part of the substrate surface** (in Figure 1: the contact fingers; in Figure 2: the backside and the edges). By passing gas through the enclosed space created by the walls of the apparatus and the protected substrate surface, a gas barrier is formed on the protected substrate surface so that it is deprived of the chance **to get in contact with the plating solution**.

Based on distinctions between the design and purposes of Dubin's system and the system in the present application, it is reasonable to state that it would not have been obvious to one with ordinary skill in the art to modify Sturm and use the plating process by Dubin for depositing the low work function electrode layer and **to protect it from oxidation** both during and after the deposition process.

Claim 7:

After the amendment made to Claims 1 and 7 (sections [1.1] and [1.6]), Claim 7 teaches a **post-deposition treatment** on the first and second electrodes in a reducing atmosphere in order to minimize content of oxygen and water. It is reasonable to state that it would not have been obvious to one with ordinary skill in the art to modify Sturm and use the plating process by Dubin for a **post-deposition treatment** on the electrodes after the formation of the electrode layers.

[3.3] Please allow Claims 8 of the present application, which is rejected by the examiner under 35 U.S.C 103 (a) (refer to examiner's detailed action item No. 8) as being unpatentable over Sturm (US Patent No. 6,087,196), in view of Dimitrakopoulos (US 6,334,662), based on the following rounds:

Claim 8:

After the amendment made to Claims 1 and 8, Claim 8 of the present application teaches methods for deposition of the organic semiconductor layer using solution techniques, including spin coating, screen printing, thermal transfer printing, spray and dip-coating.

Dimitrakopoulos teaches forming thin film transistor (TFT) devices based on an **organic-inorganic hybrid perovskite semiconductor layer.** He further teaches forming this **organic-inorganic hybrid perovskite semiconductor layer** using a process such as vacuum, dip coating, stamping, screening, spraying and ink-jet printing. Since the semiconductor layer in the present application is an **organic semiconductor** and the one in Dimitrakopoulos's is an **organic-inorganic hybrid semiconductor**, it is reasonable to state that it would not have been obvious to one with ordinary skill in the art to modify Sturm and use the process by Dimitrakopoulos to form the organic semiconductor layer in the present application.

The applicants hope that the above-described amendment is acceptable to you and respectfully request that a timely Notice of Allowance be issues in this case.

Respectfully submitted,

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